dish NETWORK

Satellite Digital Carriage Issues

Cable and Satellite Comparison

Current Capacity Breakdown

Cable

Satellite

Cable vs. DBS Digital Bandwidth

Cable can conserve bandwidth through transition from analog to digital

Analog signal on cable system

Full 19.4 digital signal on cable system, all bits

In contrast, any HD must carry obligation would require more bandwidth for all-digital DBS platform

Converted analog signal on DBS system (compressed MPEG-2)

Full 19.4 digital signal on DBS system, all bits

Digital HD signal (compressed MPEG-4)

Compression Technology

MPEG-2 v. MPEG-4

Compression allows DBS providers to maximize efficiency of finite spectrum resources.

MPEG-2 compression is used for SD programming.

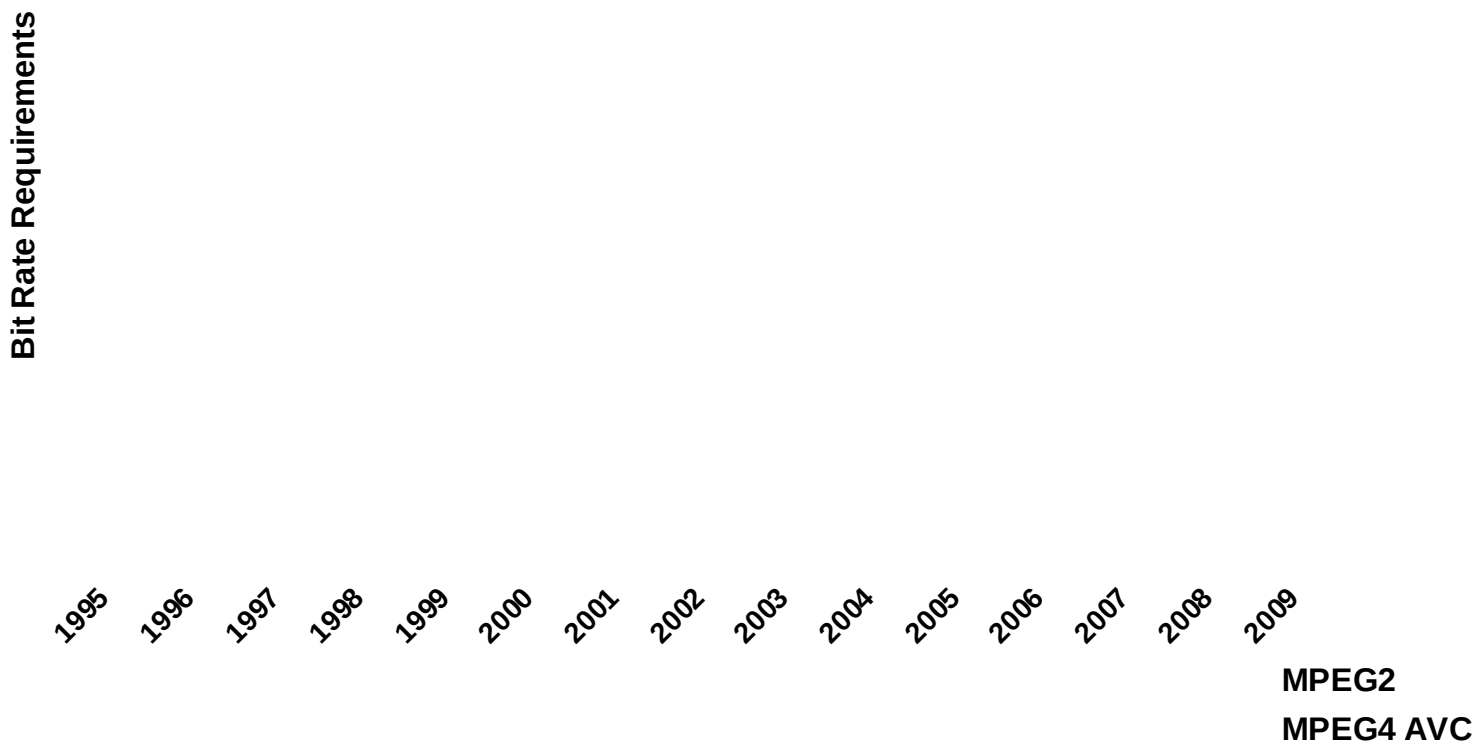
- MPEG-2 is standard used by cable, broadcasters, and cable programmers.
- MPEG-2 set-top boxes cannot view MPEG-4 programming.

MPEG-4 compression is the next generation standard used for HD programming.

- Standard is less than 4 years old.
- MPEG-4 is used by DBS, IPTV, and some programmers (HBO)
- Only HD subscribers have MPEG-4 set-top box, which is only a small subset of DBS subscribers today.

Compression Technology

MPEG Video Encoding Performance



The majority of efficiency gains for MPEG-2 and MPEG-4 have occurred. Only incremental additional improvements are to be expected.

Capacity Constraints:

Standard Definition v. High Definition

Locals Delivered by Spot Beams

- Analog locals in 175 of 210 markets (over 1500 channels).
  - Includes must carry stations (as many as 18 per market)
  - One transponder holds approximately 13 SD local channels.

SD Transponder Today

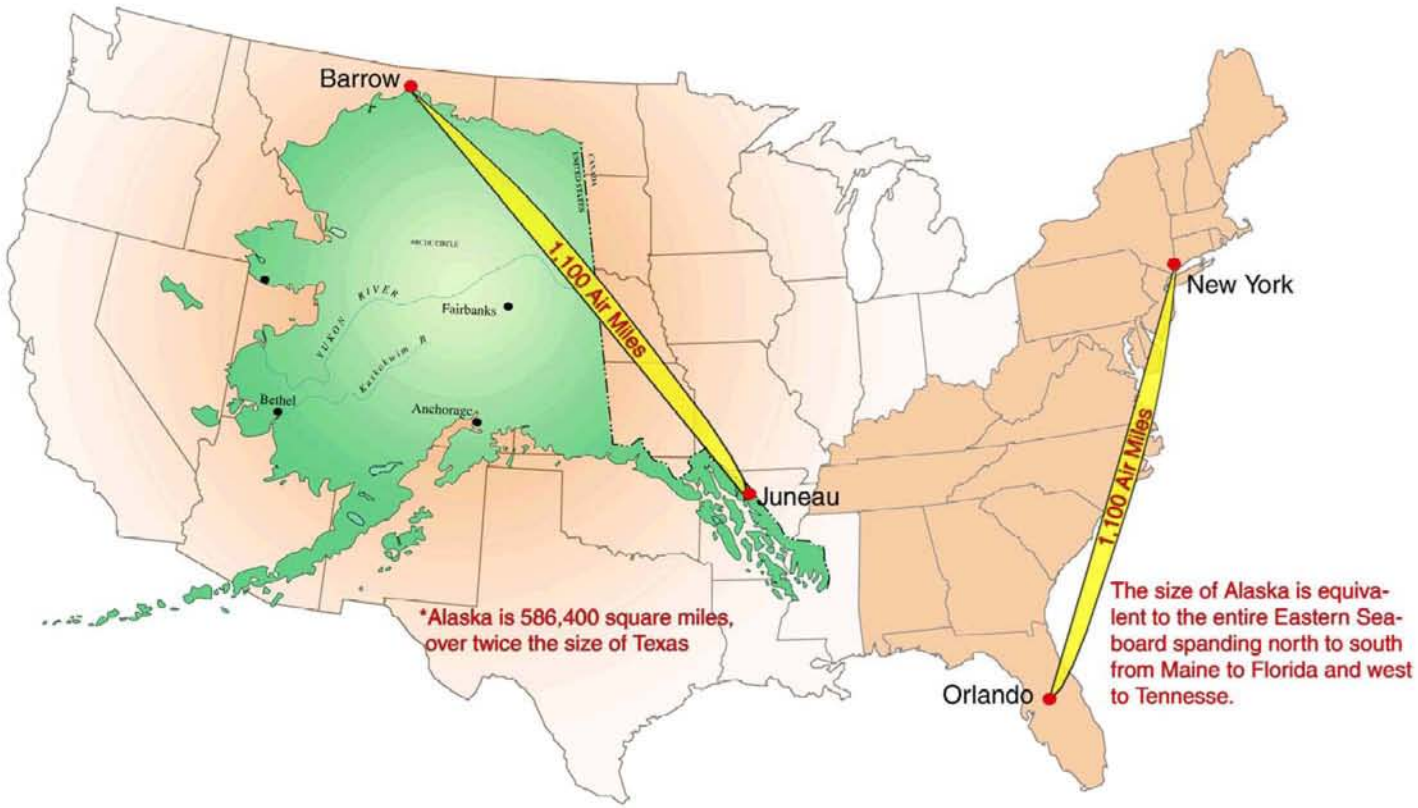
- Some HD locals provided in 29 markets
  - One transponder holds approximately 4 HD local channels.

HD Transponder Today

Must Carry Burden

Alaska and Hawaii

- Digital must carry obligation implemented in June 2007.
- Remote location, limited number of broadcasters and DMA markets, available spectrum were critical.



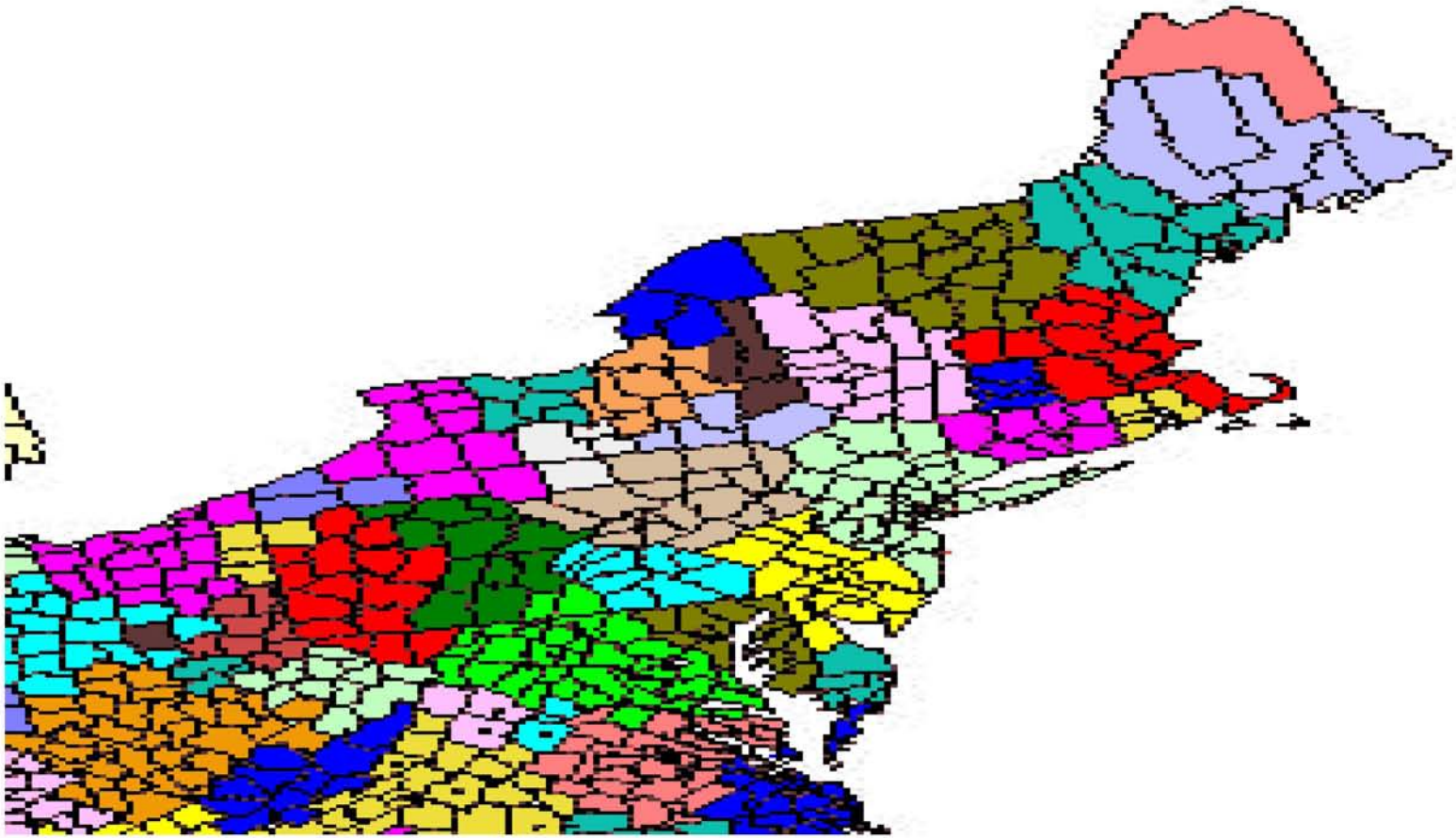
San Francisco DMA

- 20 total broadcasters in SF DMA. Served today by 3 spot beam transponders.
- A SD and HD obligation would require up to 4 more transponder frequencies based on today's compression.

Before

After

Northeast Traffic Jam



Northeast Traffic Jam

Spot Beam Transponders

Echo X **Echo VII**

Non-Spot Beam Transponders

This overflow use of national transponders is highly inefficient

Echo III **Echo IX** **Anik F3**

Echo VII **Echo V**

Channels Per Transponder

12-13 10-11 5-10

Ripple Effect System-Wide

- System-wide impact on 175 markets with 1500 local channels
- Back of envelope math: 3 SD networks (MPEG2) = 1 HD network (MPEG4).
- HD obligation would require:

1500 SD channels (MPEG2)

X 3 (HD MPEG4 factor)

4500 SD equivalents, compressed

- Echo X, our most state-of-the-art spot beam satellite, currently provides the equivalent of **1160** analog local channels (or **386** HD channels).

Timing

Need for New Satellites and Spectrum

- DISH Network does not have capacity to deliver HD must carry stations based on available spectrum resources and current satellite fleet.
- Additional spectrum and satellites would be necessary to provide HD must carry stations in approximately 175 markets.
  - Best case scenario: new satellites take approximately 4-5 years to design and launch once new spectrum is available.